1.0 Permit Requirements

E.1. Stormwater Management

An acceptable stormwater management program shall be maintained in accordance with the Environment Article, Title 4, Subtitle 2, Annotated Code of Maryland. At a minimum, Baltimore County shall:

a. Implement the stormwater management design policies, principles, methods, and practices found in the *2000 Maryland Stormwater Design Manual* or other innovative stormwater management technologies approved by MDE;

b. Track progress toward implementing the *2000 Maryland Stormwater Design Manual* or other innovative stormwater management technologies approved by MDE and report annually the modifications needed to address any programmatic problems; and

c. Maintain programmatic and implementation information according to the requirement established as part of MDE's triennial stormwater program review.

E.2. Stormwater Management BMP Inspections

a. Within 6 months of this permit being issued, Baltimore County shall designate sufficient staff and resources to ensure that maintenance inspections are performed for all stormwater management BMPs in the County. At a minimum, the County shall:

   i. identify the specific individual(s) responsible for BMP maintenance inspections;

   ii. develop and implement specific written procedures for conducting routine maintenance inspections, preparing inspection reports, enforcing requirements, and following up to ensure that specified maintenance is performed for all BMPs in Baltimore County;

   iii. perform routine maintenance inspections on all stormwater management BMPs in Baltimore County by June 15, 2007; and

   iv. submit annually copies of all BMP maintenance inspection reports and a current database of all stormwater management BMPs in Baltimore County with each facility's maintenance status clearly described.

b. In its first report, Baltimore County shall report the progress toward completing the BMP maintenance inspections specified in Part III E.2.a. above. Based on Baltimore County's progress toward inspecting all BMPs, MDE will approve a maintenance inspection frequency for the remainder of this permit.

1.1 Introduction

The Stormwater Management Program addresses the impacts on stormwater quantity and quality resulting from new development after the construction phase is complete. These impacts are mainly associated with the increase in impervious area due to the installation of roadways and buildings. Effective July 2, 2001 the requirements of the new Maryland Stormwater Design Manual have been applied to new development. Baltimore County has been delegated authority by the State of Maryland to enforce stormwater management regulations. The Stormwater Management Program is located within the DEPRM – Stormwater Engineering Section. This program is periodically reviewed by the Maryland Department of the Environment (MDE) and has consistently passed the review requirements.

The Program contains several components, including:

- review of stormwater management facilities plans,
- review of variance and associated fee-in-lieu requests,
- as built inspections, and
- periodic inspections.

The Operations Program, located within the DEPRM Capital Program and Operations Section, performs inspections and maintenance on the stormwater management facilities owned by Baltimore County. Two inspectors and a supervisor were added in fiscal year 2006 to conduct three-year inspections of private stormwater management facilities. These personnel are located in the Stormwater Engineering Section.

1.2 Plan, and Variance and Fee-in-lieu Reviews

1.2.1 Plan Reviews

During the calendar year 2007 one thousand three hundred (1,300) plans were reviewed for stormwater management. Of these, two hundred and sixty-three (263) were approved, one thousand and thirty-four (1,034) were denied and one hundred and three (103) were pending at the end of the year. Most plans are not approved on the first submittal, and these numbers reflect multiple plan submittals for the same project.

1.2.2 Variance and Fee-in-lieu Reviews

A variance in accordance with Council Bill 51-01 may be approved for a project when exceptional circumstances are applicable to the site. A variance is only granted when the result is more beneficial for the watershed and it is accompanied by a fee-in-lieu. This option is only acceptable to Baltimore County if it is proven to be infeasible to provide SWM on site and a suitable outfall has been identified for the project. The fee-in-lieu money is used by DEPRM's Capital Program and Operations section for water quality restoration projects. Table 1-1 indicates the fee-in-lieu money received by watershed for the calendar year 2007.

Table 1-1: Fee-in-lieu money received in 2007

Watershed	# of Projects	Fee-in-lieu
Upper Western Shore		
Deer Creek	1	$5,800
Prettyboy Reservoir	4	$35,208
Loch Raven Reservoir	23	$165,261
Lower Gunpowder	6	$25,220
Little Gunpowder Falls	5	$26,960
Bird River	9	$95,680
Gunpowder River	9	$32,553
Middle River	1	$2,100
Upper Western Shore Total	**58**	**$388,782.00**
Patapsco/Back River		
Liberty Reservoir	1	$600
Patapsco	10	$110,977
Gwynns Falls	10	$89,240
Jones Falls	9	$54,690
Back River	9	$78,141
Baltimore Harbor	2	$11,000
Patapsco/Back River Total	**41**	**$344,648.00**
County Totals	**99**	**$733,430.00**

1.3 Approved Stormwater Management Facility Analysis

The database of approved stormwater management facilities indicates that 3,226 facilities have been approved through the end of 2007. Of the 3,226 approved facilities 2,018 have been built (871 public and 1,247 private). Table 1-2 lists approved facilities, but not necessarily built, by watershed, type and ownership. The last two sections of the table include both the total approved facilities by watershed and the number of built facilities by watershed.

The 3,226 approved facilities listed in Table 1-2 will if built serve 34,766 acres of urban land. Fifty-two (52%) percent of all approved facilities are privately owned and operated. The private facilities represent forty-five (45%) percent of the drainage area served by stormwater management facilities. The 2,018 built facilities serve 25,818 acres of urban land, with forty-three (43%) percent of the drainage area served by private facilities.

Stormwater management facilities classified as detention ponds provide minimal water quality. The database indicates that there are approved plans for 609 dry detention pond facilities serving 13,051 acres of urban land. There are 260 in public ownership and these represent 7,936 acres of the drainage area. These facilities present an opportunity for conversion in the future to other facility types with greater pollutant removal potential. An assessment of the existing stormwater management facilities and possibilities for conversion is a component of each watershed management plan. Conversions are typically cost effective only for facilities with greater than ten acres of drainage. Preparation of Small Watershed Action Plans (see Section 7) will result in assessing each built stormwater management facility for conversion possibilities.

Table 1-2: Approved Stormwater Management Facilities by Watershed Through 2007

Watershed	Detention Ponds (DP)				Extended Detention (ED, EDSD, EDSW)			
	Private		Public		Private		Public	
	N	D.A.	N	D.A.	N	D.A.	N	D.A.
Upper Western Shore								
Deer Creek	0	0	0	0	0	0	0	0
Prettyboy Res.	0	0	0	0	1	2	7	76
Loch Raven Res.	68	1,326	33	1,166	64	711	52	1,216
Lower Gunpowder	16	175	39	1,140	23	167	54	696
Little Gunpowder	3	3	0	0	5	16	11	113
Bird River	36	501	32	781	57	405	58	632
Gunpowder River	1	14	3	115	2	4	3	9
Middle River	11	96	3	138	3	5	4	26
UWS Totals	**135**	**2,231**	**110**	**3,340**	**155**	**1310**	**189**	**2,768**
Patapsco/Back River								
Liberty Res.	0	0	1	8	8	44	11	201
Patapsco River	36	489	37	1,357	53	732	53	546
Gwynns Falls	78	1,154	71	2,280	127	1,283	124	1,788
Jones Falls	33	816	21	720	57	633	23	497
Back River	60	396	18	145	65	447	38	368
Baltimore Harbor	7	144	2	86	7	22	1	14
Patapsco/Back R. Tot	**214**	**2,999**	**150**	**4,596**	**317**	**3,161**	**250**	**3,414**
County Totals	**349**	**5,230**	**260**	**7,936**	**472**	**4,471**	**439**	**6,182**

Watershed	Retention Pond (WP & SM)				Infiltration Basins, Trenches, Dry Wells, Porous Paving (DW, PP, IT, TTWQE & IB)			
	Private		Public		Private		Public	
	N	D.A.	N	D.A.	N	D.A.	N	D.A.
Upper Western Shore								
Deer Creek	0	0	0	0	0	0	0	0
Prettyboy Res.	0	0	0	0	1	13	0	0
Loch Raven Res.	10	289	5	94	53	188	15	136
Lower Gunpowder	2	300	5	96	4	11	5	28
Little Gunpowder	1	50	1	7	4	56	3	35
Bird River	21	724	9	188	13	30	13	55
Gunpowder River	4	0	7	84	1	11	8	13
Middle River	15	258	10	174	9	8	4	8
UWS Totals	**53**	**1621**	**37**	**643**	**85**	**317**	**48**	**275**
Patapsco/Back River								
Liberty Res.	1	22	0	0	10	22	0	0
Patapsco River	11	136	9	141	42	86	12	217
Gwynns Falls	16	289	6	167	55	61	22	46
Jones Falls	5	879	2	31	22	44	3	20
Back River	13	138	8	860	16	17	2	8
Baltimore Harbor	6	64	3	261	11	16	1	2
Patapsco/Back R. Tot	**52**	**1528**	**28**	**1460**	**156**	**246**	**40**	**293**
County Totals	**105**	**3,149**	**65**	**2,103**	**241**	**553**	**88**	**568**

Table 1-2: Approved Stormwater Management Facilities by Watershed Through 2007 (continued)

Watershed	Sand Filter and Bioretention (SF)				Underground Storage & Oil/Grit Separator (UGS, OGS, SC)			
	Private		Public		Private		Public	
	N	D.A.	N	D.A.	N	D.A.	N	D.A.
Upper Western Shore								
Deer Creek	0	0	0	0	0	0	0	0
Prettyboy Res.	0	0	3	18	0	0	0	0
Loch Raven Res.	66	222	68	594	80	193	1	25
Lower Gunpowder	20	93	20	124	18	50	1	2
Little Gunpowder	4	8	3	37	2	1	0	0
Bird River	31	90	52	298	26	65	5	25
Gunpowder River	3	4	4	16	0	0	0	0
Middle River	16	40	5	57	6	16	2	2
UWS Totals	**140**	**457**	**155**	**1144**	**132**	**325**	**9**	**54**
Patapsco/Back River								
Liberty Res.	12	18	14	98	4	2	0	0
Patapsco River	39	77	31	175	37	148	8	17
Gwynns Falls	89	265	49	227	102	281	4	32
Jones Falls	49	114	27	148	53	168	9	109
Back River	49	108	26	98	41	88	1	1
Baltimore Harbor	4	20	0	0	10	11	4	3
Patapsco/Back R. Tot	**242**	**602**	**147**	**746**	**247**	**698**	**26**	**162**
County Totals	**382**	**1059**	**302**	**1,890**	**379**	**1,023**	**35**	**216**

Watershed	Other (CD, GS, LS, O)			
	Private		Public	
	N	D.A.	N	D.A.
Upper Western Shore				
Deer Creek	0	0	0	0
Prettyboy Res.	0	0	1	1
Loch Raven Res.	5	10	21	61
Lower Gunpowder	3	7	3	12
Little Gunpowder	2	2	2	10
Bird River	3	36	5	10
Gunpowder River	0	0	1	1
Middle River	2	6	2	66
UWS Totals	**15**	**61**	**35**	**161**
Patapsco/Back River				
Liberty Res.	1	1	2	1
Patapsco River	7	9	1	0
Gwynns Falls	13	39	8	208
Jones Falls	8	15	7	9
Back River	8	15	5	16
Baltimore Harbor	1	1	0	0
Patapsco/Back R. Tot	**38**	**80**	**23**	**234**
County Totals	**53**	**141**	**58**	**395**

Table 1-2: Approved Stormwater Management Facilities by Watershed Through 2007 (continued)

Watershed	Total Approved SWM				Total Constructed SWM			
	Private		Public		Private		Public	
	N	D.A.	N	D.A.	N	D.A.	N	D.A.
Upper Western Shore								
Deer Creek	0	0	0	0	0	0	0	0
Prettyboy Res.	1	0	10	68	0	0	3	39
Loch Raven Res.	346	2,939	195	3,292	243	2,363	130	2,507
Lower Gunpowder	86	804	127	2,097	60	702	92	1,789
Little Gunpowder	21	137	20	202	8	118	14	136
Bird River	187	1,851	174	1,989	114	1,177	95	1,443
Gunpowder River	11	32	26	239	2	1	15	189
Middle River	62	428	30	470	27	271	14	276
UWS Totals	**714**	**6,191**	**582**	**8,357**	**454**	**4,632**	**363**	**6,379**
Patapsco/Back River								
Liberty Res.	36	109	28	307	14	66	10	150
Patapsco River	225	1,677	151	2,452	125	1,092	90	1,949
Gwynns Falls	480	3,372	284	4,748	316	2,542	185	3,947
Jones Falls	227	2,669	92	1,534	143	1,484	54	1,285
Back River	252	1,210	98	1,496	164	893	62	889
Baltimore Harbor	46	278	11	366	31	238	7	274
Patapsco/Back R. Tot	**1266**	**9,315**	**664**	**10,903**	**793**	**6,315**	**408**	**8,494**
County Totals	**1,980**	**15,506**	**1,246**	**19,260**	**1,247**	**10,947**	**771**	**14,873**

Figure 1-1 displays the number of approved facilities, both private and public, by watershed. The Gwynns Falls watershed continues to have the greatest total number of existing and newly approved facilities. The large number of facilities in the Gwynns Falls watershed can be attributed to the fact that Owings Mills has been designated as a growth area. Deer Creek, Prettyboy Reservoir, Liberty Reservoir, the Little Gunpowder Falls and the Gunpowder River watersheds have only a few facilities, which is reflective of fewer development projects and the small size of those watersheds. This pattern has not changed from past reports.

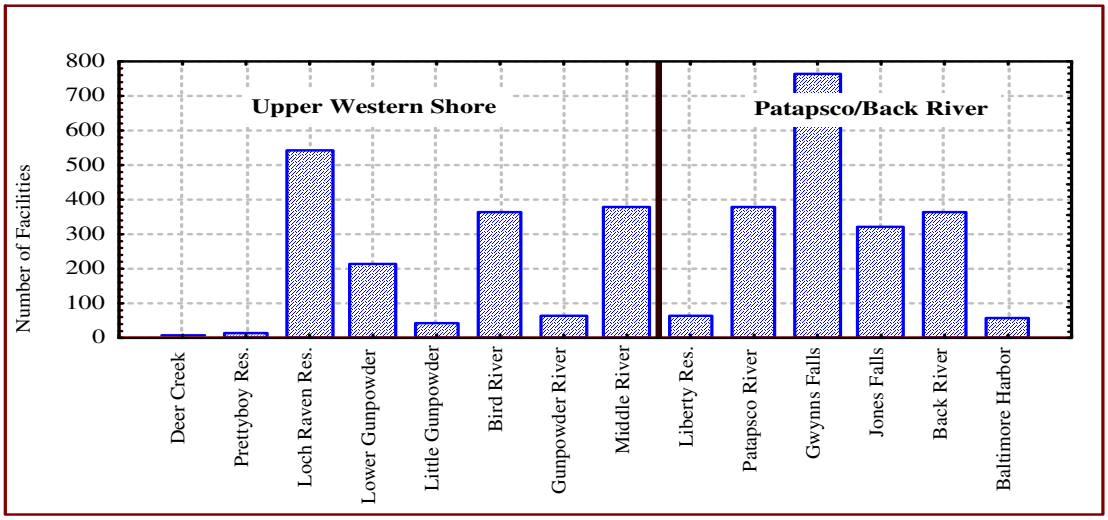

Figure 1-1: Number of Approved SWM Facilities by Watershed – Through Calendar Year 2007.

Figure 1-2 displays acreage to be served by approved private stormwater management facilities by watershed, and Figure 1-3 displays the same information for public facilities.

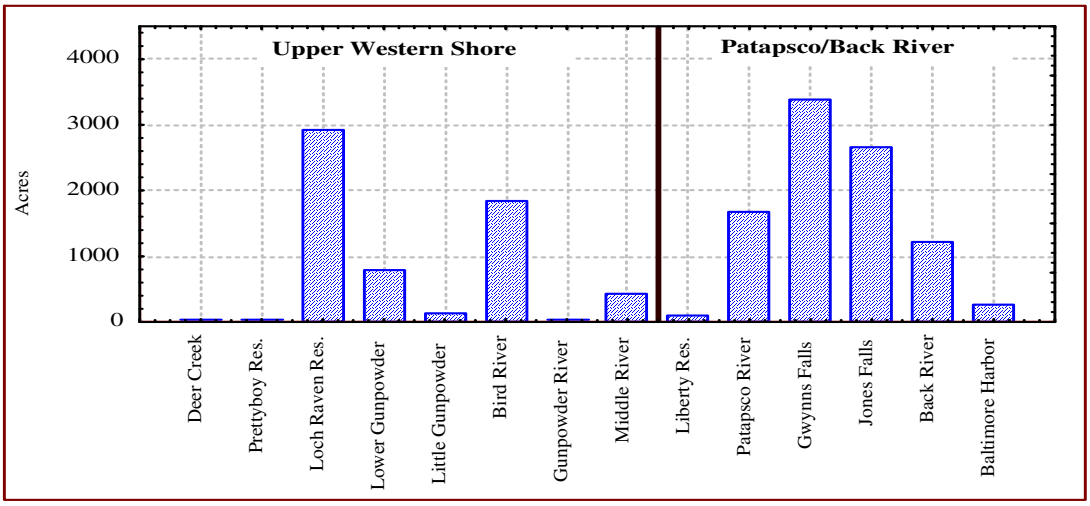

Figure 1-2: Acreage Served by Approved Private SWM Facilities by Watershed Through Calendar Year 2007.

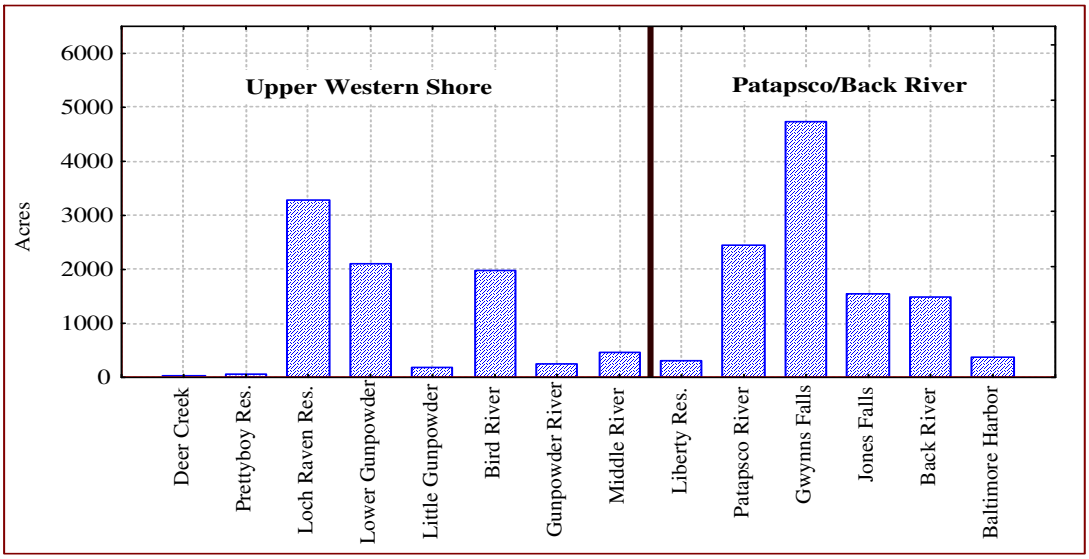

Figure 1-3: Acreage Served by Approved Public SWM Facilities by Watershed Through Calendar Year 2007.

1.4 Inspections

Inspections of stormwater management facilities are conducted by the Stormwater Engineering Section for private facilities and by the Capital Programs and Operations Section for public facilities. The Stormwater Engineering Section added two Engineering Associates III to conduct three-year inspections of private stormwater facilities in 2005. In addition, an existing Engineering Associate IV was reassigned as a supervisor to the private facility three-year inspection program. An Engineer III was added to the Stormwater Engineering Section to provide added staff for review of stormwater management designs for new development and redevelopment.

Table 1-3 presents the SWM facility inspections conducted by DEPRM during the calendar year 2007.

Table 1-3: SWM Inspections 2007

	As Built	One year	Three year	Totals
Stormwater Engineering Section	77	41	269	**387**
Capital Program and Operation Section	0	0	156	**156**
Totals	**77**	**41**	**425**	**543**

All as-built inspections and one-year inspections are completed by the Stormwater Engineering Section. A total of seventy-seven (77) as-built inspections were completed in calendar year 2007. A total of forty-one (41) one-year inspections were completed. Approval of the one-year maintenance inspection initiates the three-year maintenance inspection cycle. The Stormwater Engineering Section also completes three-year inspections for the facilities in private ownership. A total of two hundred sixty-nine (269) three-year inspections of private stormwater facilities were conducted.

The three-year inspection of publicly owned facilities is completed by the Capital Program and Operations Section. A total of one hundred and fifty-six (156) three-year inspections were completed for public ponds. This results in a total of four hundred and twenty-five (425) three-year inspections of all stormwater management facilities by DEPRM for the calendar year 2007. This represents 21% of the built facilities in Baltimore County and indicates that the program is below last year's inspection totals and not achieving its goal to inspect all built facilities every three years. The Stormwater Engineering Section was down one inspector during much of the year, but has now refilled that position. It is anticipated that the number of inspections will increase back to its expected goal.

1.5 Stormwater Management Facility Maintenance

The Baltimore County Department of Environmental Protection and Resource Management has an operations crew in the Capital Program and Operations Section. This crew consists of six environmental maintenance specialists and one supervisor. The crews are divided geographically into central, eastern and western districts. A database has been developed to track all routine maintenance and responses to complaints. Table 1-4 summarizes the number of maintenance visits due to complaints versus routine maintenance. There were one hundred and four (104) routine maintenance assessments and seventy-eight (78) complaint driven site assessments during the calendar year 2007.

Table 1-4: Stormwater Facility Maintenance Visits by Type 2007

Watershed	# of Routine Maintenance Visits	# of Complaint Maintenance Visits
Loch Raven Reservoir	12	5
Lower Gunpowder	20	6
Little Gunpowder	0	1
Bird River	6	3
Gunpowder River	0	3
Middle River	7	3
Liberty Reservoir	0	0
Patapsco River	13	11
Gwynns Falls	22	37
Jones Falls	8	4
Back River	16	5
Total	**104**	**78**

A summary of the maintenance activities for the time period by watershed and drainage basin is presented in Table 1-5. One hundred and ninety-six (196) facilities were maintained during the reporting time period. The total number of site visits was two hundred and eighty-five (285), indicating that some facilities required several visits. The most frequent activities are debris removal, cleaning of the riser, and cleaning the low flow channel. Appendix 1-1 contains the SWM maintenance data for the time period of January 1, 2007 through December 31, 2007. The data are arranged by watershed, with facility ID number, and by type of maintenance activity.

Table 1-5: SWM Pond Maintenance Activities for Calendar Year 2007

Watershed	# Ponds Maintained	Total # inspections	Tar- Riser	Repair Fence	Secure Gate	Clean Riser	Clean Low Flow	Remove Debris	Trim Fence	Clear Berm
Upper Western Shore										
Prettyboy	0	0	0	0	0	0	0	0	0	0
Loch Raven	24	34	2	10	16	18	12	22	16	9
Lower Gunpowder	43	65	4	5	35	40	39	41	32	15
Little Gunpowder	2	3	0	0	1	1	2	1	1	1
Bird River	23	34	3	7	14	13	19	23	16	6
Gunpowder River	5	7	0	1	2	4	4	6	3	0
Middle River	4	12	0	2	3	1	4	7	4	2
Upper West Shore. Total	**101**	**155**	**9**	**25**	**71**	**77**	**80**	**100**	**72**	**33**
Patapsco/Back River										
Liberty	1	1	0	1	0	1	1	0	1	0
Patapsco	28	37	1	7	11	18	27	26	15	21
Gwynns Falls	39	49	1	19	29	37	38	41	32	30
Jones Falls	8	10	1	2	5	7	9	9	6	0
Back River	19	33	2	6	15	14	14	23	16	5
Baltimore Harbor	0	0	0	0	0	0	0	0	0	0
Patapsco/Back River Total	**95**	**130**	**5**	**35**	**60**	**77**	**89**	**99**	**70**	**56**
County Totals	**196**	**285**	**14**	**60**	**131**	**154**	**169**	**199**	**142**	**89**

1.6 Constructed Stormwater Management Facility Data Analysis

An analysis of the databases related to stormwater management facilities indicated that a total of 2,018 facilities have been built to date. The 2,018 built facilities have a combined drainage area of 25,818 acres. The drainage areas of 1,276 built facilities were delineated and digitized into the County GIS. The drainage area for the 1,276 facilities that have been delineated is 22,445 acres or approximately 87% of the area served by the built stormwater facilities. The remaining 842 built facilities have a combined drainage area of 3,375 acres (13% of the area served by stormwater management). As new facilities are built their drainage areas will also be added to the GIS data layer. Overall, built stormwater management facilities serve 17% of the designated urban acreage (151,038 acres). The total urban acreage is based on the Maryland Department of Planning 2002 land use data.

The drainage areas were overlaid on the Maryland Department of Planning 2002 land use data to determine the specific land use draining to each facility. Table 1-6 presents a summary of the land use served by built SWM facilities by watershed. It should be noted that the date of the creation of the MDP GIS data layer might precede the building of a number of the stormwater management facilities. This fact will result in some error in the determination of land use draining to those facilities.

Table 1-6: Constructed SWM Facility Drainage Area Land Use (Acres) through Calendar Year 2007

Watershed	LDR	MDR	HDR	Commercial	Industrial	Institutional	Extractive	Open Urban	Agriculture	Forest and Wetlands	Bare Ground	Total
PR	21	0	0	0	0	0	0	0	1	1	0	23
LR	981	355	747	526	254	330	1	123	297	566	42	4222
GU	271	763	336	39	44	50	0	12	165	173	14	1867
LG	156	13	0	13	0	3	0	0	44	22	0	251
BI	42	624	503	194	177	77	0	49	54	333	13	2066
GR	0	87	29	4	0	0	0	0	0	16	0	136
MR	0	23	127	41	3	1	0	4	0	45	54	298
UWS	**1471**	**1865**	**1742**	**817**	**478**	**461**	**1**	**188**	**561**	**1156**	**123**	**8863**
LI	31	15	0	3	0	5	0	2	7	47	0	**110**
PA	185	728	552	143	255	89	0	94	91	389	7	**2566**
GW	502	1868	1068	580	401	176	0	102	115	520	54	**538686**
JF	897	668	529	213	25	169	96	86	158	414	52	**3307**
BR	333	243	148	316	443	78	0	63	19	239	15	**1897**
BH	1	71	6	66	65	48	0	48	0	40	0	**345**
P/B	**4891**	**7323**	**5787**	**2955**	**2145**	**1487**	**96**	**395**	**390**	**1649**	**374**	**13578**
County	**3420**	**5458**	**4045**	**2138**	**1667**	**1026**	**97**	**583**	**951**	**2805**	**251**	**22441**

LR = Loch Raven Reservoir
GU = Lower Gunpowder
BI = Bird River
PA = Patapsco River
GW = Gwynns Falls
MR = Middle River
BR = Back River
PR = Prettyboy Reservoir
LG = Little Gunpowder Falls
GR = Gunpowder River
LI = Liberty Reservoir
JF = Jones Falls
BH = Baltimore Harbor
LDR = Low Density Residential
MDR = Medium Density Residential
HDR = High Density Residential

The pollutant loads were determined by the methodology described in Section 10 for each of the 1,276 facilities that are currently built. The drainage areas for these facilities have been digitized into the GIS and are displayed in Table 1-7 by watershed for TSS, TP, and TN. The table is organized into watersheds and the two Tributary Strategy groups. A separate load is calculated for the Upper Western Shore and the Patapsco/Back River basins.

Table 1-7: Pollutant Loads to Constructed SWM Facilities by Watershed

Watershed	(#) TSS	(#) TP	(#) TN
Upper Western Shore			
Prettyboy Res.	3,386	21.0	193
Loch Raven Res.	748,034	3,213.0	32,115
Lower Gunpowder	302,928	1,485.5	14,851
Little Gunpowder	40,696	210.7	2,202
Bird River	372,680	2,049.9	18,300
Gunpowder River	22,424	104.4	989
Middle River	40,1615	304.9	2,646
Total	**1,891,763763**	**7,389.4**	**71,296**
Patapsco/Back River			
Liberty Res.	13,191	61.8	644
Patapsco	445,254	1,847.7	18,053
Gwynns Falls	1,027,924	4,280.1	40,541
Jones Falls	507,072	2610.0	24,843
Back River	447,594	1864.7	16,921
Baltimore Harbor	78,943	351.0	3,118
Total	**2,519,978**	**11,015.3**	**104,120**
County Total	**4,411,741**	**18,404.7**	**175,416**

The type of stormwater management facility has an influence on the percentage of a pollutant removed. Through a series of meetings conducted by the Chesapeake Bay Program – Urban Stormwater Workgroup a consensus was reached on the pollutant removal efficiencies by categories of practice for total suspended solids (TSS), total phosphorus (TP) and total nitrogen (TN). A copy of the resulting *Draft Recommendation for Storm Water Best Management Practice Categories and Pollutant Removal Efficiencies* document was included with Baltimore County's 2004 NPDES report. Table 1-8 reflects the pollutant removal efficiencies based on the consensus document. An additional change based on the *Draft Recommendation for Storm Water Best Management Practice Categories and Pollutant Removal Efficiencies* document is the type of facility to include in each practice category. The type of practice included in each category is indicated, along with the associated NPDES practice code, below Table 1-8. As shown in the table, there is a wide range of pollutant removal efficiencies by facility type as well as for pollutant type. Where there is a lack of data for a type of facility the removal efficiency for a particular pollutant was assumed to be zero. This will result in a conservative estimate of the actual amounts of pollutants removed.

Table 1-8: Percent Removal Efficiency of BMPs

BMP	Pollutants		
	TSS	TP	TN
Detention Facilities	10	10	5
Extended Detention Facilities	60	20	30
Wet Ponds	80	50	50
Infiltration Practices	90	70	50
Filtration Practices	85	60	40

Detention Facilities = Detention Pond and Hydrodynamic Devices (DP, OGS, and UGS)
Extended Detention Facilities = Extended Detention Ponds (EDSD, EDSW, ED)
Wet Ponds and Wetlands = Wet Pond and Shallow Marsh (WP and SM)
Infiltration Practices = Infiltration Trench and Infiltration Basins (IB, IT and ITWQC), Porous Paving (PP), and Dry Wells (DW)
Filtration Practices = Sand filters and Bioretention Facilities (SF, BIO)

The results of the analysis are displayed in Tables 1-9 through 1-11 for each of the three pollutants considered. The results for each of the 1,276 facilities are displayed in the same spreadsheet that contains the data for the land use served by each facility (see Section 6).

Table 1-9: Total Suspended Solids Removal by SWM Facility Type and Watershed

Watershed	Total # To SWM	Pounds of Removal by Facility Type					Total Removed	
		DP	EDP	WP	INF.	FIL.	#	%
Upper Western Shore Watersheds								
Prettyboy Res.	3,386	0	1,075	0	1,435	0	2,510	74
Loch Raven Res.	748,034	38,063	153,272	20,569	49,405	26,644	287,953	38
Lower Gunpowder	302,928	13,661	49,262	60,954	2,678	4,289	130,844	43
Little Gunpowder	40,696	206	11,086	5,729	10,461	1,170	28,652	70
Bird River	372,680	16,817	49,016	74,370	19,811	6,662	166,676	45
Gunpowder River	22,424	1,316	0	7,415	0	0	8,731	39
Middle River	40,161	1,741	548	8,166	1,054	8,890	20,399	51
Totals	**1,530,309**	**71,804**	**264,259**	**177,203**	**84,844**	**47,655**	**645,765**	**42**
Patapsco-Back River Watersheds								
Liberty Res.	13,191	98	5,634	948	1,430	40	8,150	62
Patapsco	445,254	26,470	72,965	34,537	9,165	4,754	147,891	33
Gwynns Falls	1,027,924	52,070	228,591	75,547	11,822	15,864	383,894	37
Jones Falls	507,072	26,158	91,306	54,974	6,493	14,776	193,707	38
Back River	447,594	14,715	88,269	108,127	2,605	12,986	226,702	51
Baltimore Harbor	78,943	4,853	7,830	13,301	620	43	26,647	34
Totals	**2,519,978**	**124,364**	**494,595**	**287,434**	**32,135**	**48,463**	**986,991**	39
Balt. Co. Totals	**4,050,560**	**196,168**	**758,854**	**464,637**	**116,979**	**96,118**	**1,632,756**	**40**

Table 1-10: Total Phosphorus Removal by SWM Facility Type and Watershed

Watershed	Total # To SWM	Pounds of Removal by Facility Type					Total Removed	
		DP	EDP	WP	INF.	FIL.	#	%
Upper Western Shore Watersheds								
Prettyboy Res.	21.0	0	5.8	0	6.6	0	12.4	59
Loch Raven Res.	3,213.0	162.1	552.2	70.3	113.6	111.1	1,009.3	31
Lower Gunpowder	1,485.5	71.9	217.5	141.9	11.7	18.3	461.3	31
Little Gunpowder	210.7	0.4	46.9	23.5	43.6	2.3	116.7	55
Bird River	2,049.9	94.8	227.4	246.9	73.3	29.3	671.7	33
Gunpowder River	104.4	6.6	0	19.0	0	0	25.6	25
Middle River	304.9	14.6	2.5	59.7	4.0	17.5	98.3	32
Totals	**7,389.4**	**350.4**	**10,52.3**	**561.3**	**252.8**	**178.5**	**2,395.3**	**32**
Patapsco/Back River Watersheds								
Liberty Res.	61.8	0.2	24.7	0.2	6.8	0	31.9	52
Patapsco	1,847.7	109.6	269.7	82.6	20.2	10.6	492.7	27
Gwynns Falls	4,280.1	207.4	895.8	133.6	46.8	48.4	1332	31
Jones Falls	2,610.0	127.1	397.9	209.6	25.7	52.2	812.5	31
Back River	1,864.7	56.9	306.6	287.3	3.9	61.5	716.2	38
Baltimore Harbor	351.0	28.2	11.6	22.1	0.9	0.1	62.9	18
Totals	**11,015.3**	**529.4**	**1,906.3**	**735.4**	**104.3**	**172.8**	**3,448.2**	31
County Total	**18,404.7**	**879.8**	**2,958.6**	**1,296.7**	**357.1**	**351.3**	**5,843.5**	**32**

Table 1-11: Total Nitrogen Removal by SWM Facility Type and Watershed

Watershed	Total # To SWM	Pounds of Removal by Facility Type					Total Removed	
		DP	EDP	WP	INF.	FIL.	#	%
Upper Western Shore Watersheds								
Prettyboy Res.	193	0	30	0	47	0	77	40
Loch Raven Res.	32,115	800	3,414	660	842	694	6,410	20
Lower Gunpowder	14,851	339	1,379	1,532	67	112	3,429	23
Little Gunpowder	2,202	2	333	196	315	12	858	39
Bird River	18,300	414	1,291	2,190	458	167	4,520	25
Gunpowder River	989	32	0	177	0	0	209	21
Middle River	2,646	64	14	491	29	110	708	27
Totals	**71,296**	**1,651**	**6,461**	**5,246**	**1,758**	**1,095**	**16,211**	**23**
Patapsco/Back River Watersheds								
Liberty Res.	644	1	147	17	50	1	216	34
Patapsco	18,053	547	1,551	753	132	73	3,056	17
Gwynns Falls	40,541	982	5,077	1,329	328	268	7,984	20
Jones Falls	24,843	610	2,217	1,920	160	434	5,341	21
Back River	16,921	259	1,685	2,590	40	342	4,916	29
Baltimore Harbor	3,118	120	84	205	10	1	420	13
Totals	**104,120**	**2,519**	**10,761**	**6,814**	**720**	**1,119**	**21,933**	21
County Total	**175,416**	**4,170**	**17,222**	**12,060**	**2,478**	**2,214**	**38,144**	**22**

While the load reductions are conservative numbers, it is apparent from an inspection of Table 1-10 and Table 1-11 (phosphorus and nitrogen loads) that the County has not achieved a 40% reduction of these two constituents for existing development served by

stormwater management facilities. This calculation does not include the nitrogen and phosphorus loads from development without stormwater controls.

In order to account for the impervious area served by state-of-the-art stormwater management, an analysis of the impervious area served by stormwater management facilities was performed. The drainage areas for facilities (742) that are considered to have higher pollutant removal efficiencies and to have little or no conversion potential were overlaid on the Baltimore County impervious cover data layer. The facility types included in this analysis are wet ponds, shallow marsh, extended detention facilities, sand filters, bioretention, and infiltration facilities. Underground facilities and dry ponds were not included. The former were excluded due to low pollution removal efficiencies and the latter due to the possibility of conversion to a type of facility that has higher pollution removal efficiency. The impervious cover layer for Baltimore County does not include sidewalks and driveways. It does include all roadways and parking lots, as well as all buildings based on aerial photography obtained in the mid 1990s. This is the same data layer used to determine the impervious acreage needed to be addressed for NPDES permit conditions. The results of this analysis are presented in Table 1-12. The 2,360 acres of impervious cover addressed by advanced stormwater management represents ~76% of the impervious cover (3,100 acres) that the County must address during one 5-year term of the permit.

Table 1-12: Impervious Cover Addressed by Advanced Stormwater Management Facilities

Watershed	Road Impervious Acres	Building Impervious Acres	Total Impervious Acres
Prettyboy	2	1	3
Loch Raven	350	180	531
Lower Gunpowder	101	77	178
Little Gunpowder	14	8	22
Gunpowder River	8	5	13
Bird River	189	116	305
Middle River	33	11	44
Liberty	3	1	4
Patapsco	113	58	171
Gwynns Falls	350	180	530
Jones Falls	132	102	234
Back River	268	188	456
Baltimore Harbor	34	9	43
Total	**1,597**	**936**	**2,534**

1.7 Summary

Baltimore County operates a comprehensive stormwater management program. DEPRM has always taken a firm stand on requiring water quality treatment even when quantity management was not required. With the implementation of the new stormwater regulations DEPRM continues to require all projects to explore and implement methods for water quality treatment. DEPRM now has the option to accept a fee-in-lieu payment if an exhaustive search has resulted in no practicable opportunities.

The operation of the public stormwater management facility maintenance program within DEPRM's Capital Program and Operations Section has continued to inspect and maintain publicly owned facilities. This group has compiled an extensive database of inspections

and maintenance operations for the County's publicly owned stormwater facilities. These inspections, and the resulting actions, are improving the overall pollutant reduction efficiency of all public stormwater facilities.

Constructed stormwater management facilities serve ~17% of the total urban land, 151,038 acres (84,814 P/B and 66,223 UWS), in Baltimore County. For the areas served by these facilities a significant amount of pollutants are removed annually. Facilities designed and constructed for water quantity management represent an opportunity for water quality improvement through conversion to water quality facilities that will be explored through the Small Watershed Action Plan planning process (Section 7). However, many of the facilities either have no conversion potential (underground facilities) or are already designed to provide water quality. Those facilities designed for water quality are serving 2,360 acres of impervious cover of the County's 31,000 acres of impervious area. With the issuance of the new permit on June 15, 2005 the County is now required to address ~6,200 acres of impervious cover by 2010. The 2,360 acres of impervious cover served by state of the art water quality facilities represent ~38% of this requirement.

Appendix 1-1: Public Stormwater Facility Maintenance by Type for Calendar Year 2007

Date	Watershed	Pond #	Repaired Fence	Secured Gate	Cleaned Riser	Cleaned Low Flow	Removed Debris	Trimmed Fence	Cleared Berm	Tar Riser
03/26/2007	Back River	164	X							
07/12/2007	Back River	164								
07/30/2007	Back River	164	X							
05/07/2007	Back River	170	X	X						
10/17/2007	Back River	181	X	X	X		X	X		
03/28/2007	Back River	315								X
07/02/2007	Back River	553			X	X		X	X	
07/02/2007	Back River	554				X		X	X	
09/24/2007	Back River	554		X		X	X	X		
01/26/2007	Back River	624					X			
11/13/2007	Back River	832			X	X		X	X	X
01/26/2007	Back River	932					X			
01/25/2007	Back River	1380	X	X			X	X	X	
04/05/2007	Back River	1380	X							
06/12/2007	Back River	1380	X							
10/22/2007	Back River	1380	X	X			X	X		
04/05/2007	Back River	1547	X							
09/25/2007	Back River	1608		X			X	X		
05/01/2007	Back River	2300			X		X	X		
09/21/2007	Back River	2300			X		X	X		
06/07/2007	Back River	2915	X	X	X		X	X		
10/16/2007	Bird River	205	X		X		X	X		
01/09/2007	Bird River	348		X	X	X	X			
04/02/2007	Bird River	478								
12/26/2007	Bird River	573		X			X	X		
10/18/2007	Bird River	610	X	X		X	X	X		
03/23/2007	Bird River	754			X		X		X	
06/27/2007	Bird River	874	X		X		X			
06/07/2007	Bird River	1487	X	X			X	X		
01/10/2007	Bird River	1633			X	X	X	X		
01/08/2007	Gunpowder River	1167	X							
06/08/2007	Gunpowder River	1167	X							
08/07/2007	Gunpowder River	1167			X		X	X		
06/21/2007	Gwynns Falls	25		X	X	X	X	X	X	
05/07/2007	Gwynns Falls	33		X	X	X	X	X	X	
05/03/2007	Gwynns Falls	39		X	X	X	X	X	X	
09/13/2007	Gwynns Falls	44		X	X	X	X	X		
10/12/2007	Gwynns Falls	45		X	X	X	X	X	X	
02/12/2007	Gwynns Falls	46	X	X		X	X	X	X	
03/26/2007	Gwynns Falls	46	X							
04/10/2007	Gwynns Falls	48							X	

Date	Watershed	Pond #	Repaired Fence	Secured Gate	Cleaned Riser	Cleaned Low Flow	Removed Debris	Trimmed Fence	Cleared Berm	Tar Riser
01/16/2007	Gwynns Falls	93			X	X	X	X	X	
09/27/2007	Gwynns Falls	93	X							
08/03/2007	Gwynns Falls	110		X	X	X	X	X	X	
01/10/2007	Gwynns Falls	150		X	X	X	X	X	X	
02/12/2007	Gwynns Falls	150							X	
02/12/2007	Gwynns Falls	150							X	
04/05/2007	Gwynns Falls	150								
10/11/2007	Gwynns Falls	150								
09/21/2007	Gwynns Falls	151		X	X	X	X	X	X	
10/19/2007	Gwynns Falls	152	X	X	X	X	X	X	X	
06/06/2007	Gwynns Falls	157	X		X	X	X	X	X	
11/08/2007	Gwynns Falls	172	X	X	X	X	X	X		
11/16/2007	Gwynns Falls	173	X	X	X	X	X			
11/21/2007	Gwynns Falls	174	X		X	X	X			
05/16/2007	Gwynns Falls	219	X		X	X	X	X	X	
04/20/2007	Gwynns Falls	226	X	X	X	X	X	X	X	
04/24/2007	Gwynns Falls	227	X	X	X	X	X	X	X	
11/30/2007	Gwynns Falls	236		X	X	X	X			
08/09/2007	Gwynns Falls	238	X	X	X	X	X	X	X	
07/24/2007	Gwynns Falls	251		X	X	X	X	X		
01/02/2007	Gwynns Falls	270	X	X	X	X	X	X	X	
05/24/2007	Gwynns Falls	276	X		X	X	X	X	X	
05/18/2007	Gwynns Falls	277	X	X	X	X	X	X	X	
05/02/2007	Gwynns Falls	424	X	X	X	X	X	X	X	
06/05/2007	Gwynns Falls	432								
09/18/2007	Gwynns Falls	629		X	X	X	X	X	X	
10/16/2007	Gwynns Falls	738			X	X	X	X	X	
07/31/2007	Gwynns Falls	849	X	X	X	X	X	X		
10/03/2007	Gwynns Falls	865				X	X		X	
07/17/2007	Gwynns Falls	925	X	X	X	X	X	X	X	
08/08/2007	Gwynns Falls	967		X	X	X	X	X	X	
07/27/2007	Gwynns Falls	993		X	X	X	X	X	X	
05/30/2007	Gwynns Falls	1112	X	X	X	X	X	X	X	
07/25/2007	Gwynns Falls	1115	X	X	X	X	X	X	X	
08/28/2007	Gwynns Falls	1144	X	X	X	X	X	X	X	
08/23/2007	Gwynns Falls	1145		X	X	X	X	X	X	
03/26/2007	Gwynns Falls	1191	X	X	X	X	X	X	X	
07/10/2007	Gwynns Falls	1239			X	X	X	X		
03/29/2007	Gwynns Falls	1462	X		X	X	X		X	
11/16/2007	Gwynns Falls	1462	X		X		X			
05/02/2007	Gwynns Falls	1602	X	X	X	X	X	X		
07/11/2007	Gwynns Falls	1656			X	X	X	X	X	
06/26/2007	Gwynns Falls	1687	X	X	X	X	X	X	X	
06/26/2007	Gwynns Falls	1688	X	X	X	X	X	X	X	

Date	Watershed	Pond #	Repaired Fence	Secured Gate	Cleaned Riser	Cleaned Low Flow	Removed Debris	Trimmed Fence	Cleared Berm	Tar Riser
07/16/2007	Gwynns Falls	2031			X	X	X	X	X	
11/27/2007	Gwynns Falls	2145		X	X	X	X	X	X	
05/08/2007	Gwynns Falls	2198		X	X	X	X		X	
08/30/2007	Gwynns Falls	2204	X	X	X	X	X	X	X	
09/10/2007	Gwynns Falls	2204			X	X	X		X	
08/13/2007	Gwynns Falls	3269	X	X	X	X	X	X	X	
04/25/2007	Gwynns Falls	4393					X			
12/18/2007	Jones Falls	62		X	X	X	X		X	
12/14/2007	Jones Falls	64		X	X	X	X			
03/28/2007	Jones Falls	111								X
01/30/2007	Jones Falls	169	X	X	X	X	X	X	X	
09/26/2007	Jones Falls	500				X				
09/26/2007	Jones Falls	501				X			X	
07/03/2007	Jones Falls	547	X							
01/04/2007	Jones Falls	548			X	X	X	X		
05/24/2007	Jones Falls	1192	X	X	X	X	X	X	X	
09/18/2007	Jones Falls	1192								
01/11/2007	Jones Falls	1340	X		X	X		X		
12/19/2007	Jones Falls	1881		X		X	X		X	
03/30/2007	Little Gunpowder	2225				X	X			
06/15/2007	Loch Raven	38			X	X	X		X	
09/24/2007	Loch Raven	66				X	X		X	
03/13/2007	Loch Raven	83				X				
06/25/2007	Loch Raven	156			X	X	X		X	
12/03/2007	Loch Raven	239	X	X	X	X		X		
01/12/2007	Loch Raven	707		X		X	X	X		
03/27/2007	Loch Raven	1063				X				
11/02/2007	Loch Raven	1063			X	X	X			
03/27/2007	Loch Raven	1064	X				X			
11/02/2007	Loch Raven	1064	X	X	X	X	X	X		
09/18/2007	Loch Raven	1565								
11/02/2007	Loch Raven	1825	X		X	X	X	X	X	
11/28/2007	Loch Raven	1991			X	X				
10/25/2007	Loch Raven	2095	X							
10/25/2007	Loch Raven	2099								
08/31/2007	Loch Raven	2879				X	X	X	X	
08/07/2007	Loch Raven	2903			X			X	X	
05/07/2007	Lower Gunpowder	340	X	X						
03/13/2007	Lower Gunpowder	525				X				
03/26/2007	Lower Gunpowder	525				X				
09/24/2007	Lower Gunpowder	525			X	X		X	X	
07/31/2007	Lower Gunpowder	557				X	X	X		
08/01/2007	Lower Gunpowder	729			X		X	X		
11/13/2007	Lower Gunpowder	733	X		X	X	X	X	X	X

Date	Watershed	Pond #	Repaired Fence	Secured Gate	Cleaned Riser	Cleaned Low Flow	Removed Debris	Trimmed Fence	Cleared Berm	Tar Riser
04/30/2007	Lower Gunpowder	741				X	X	X		
09/19/2007	Lower Gunpowder	815		X		X	X	X		
03/28/2007	Lower Gunpowder	846			X	X	X		X	
04/18/2007	Lower Gunpowder	954					X			
10/31/2007	Lower Gunpowder	955			X					
09/25/2007	Lower Gunpowder	1003		X			X	X		
10/22/2007	Lower Gunpowder	1003	X	X			X	X		
05/07/2007	Lower Gunpowder	1233	X	X						
04/02/2007	Lower Gunpowder	1406	X							
10/03/2007	Lower Gunpowder	1406		X		X	X	X		
03/26/2007	Lower Gunpowder	1407	X							
03/26/2007	Lower Gunpowder	1408	X							
10/03/2007	Lower Gunpowder	1408	X	X		X	X	X		
08/01/2007	Lower Gunpowder	1473		X	X	X		X		
08/02/2007	Lower Gunpowder	1634	X	X				X		
04/03/2007	Lower Gunpowder	1789	X							
01/02/2007	Lower Gunpowder	1842				X			X	
10/31/2007	Lower Gunpowder	1842			X	X	X	X		
06/26/2007	Lower Gunpowder	2032	X	X		X	X		X	
10/17/2007	Middle River	591			X	X	X	X		
01/17/2007	Middle River	950			X	X	X		X	X
01/30/2007	Middle River	950	X							
01/30/2007	Middle River	950	X							
07/31/2007	Middle River	950		X			X	X		
02/06/2007	Middle River	4208					X	X		
02/06/2007	Middle River	4208					X	X		
06/12/2007	Middle River	4208					X			
04/17/2007	Middle River	4254								
06/05/2007	Middle River	4254					X	X		
08/29/2007	Patapsco	202		X	X	X	X	X	X	
09/17/2007	Patapsco	278		X	X	X	X	X	X	
11/30/2007	Patapsco	358			X	X				
04/03/2007	Patapsco	359					X			
12/17/2007	Patapsco	421	X	X	X	X		X	X	
03/20/2007	Patapsco	454				X	X			
08/22/2007	Patapsco	596		X	X	X	X	X	X	
10/04/2007	Patapsco	785	X		X	X	X	X	X	
08/16/2007	Patapsco	994			X	X	X	X		
08/20/2007	Patapsco	995		X	X	X	X	X	X	
10/22/2007	Patapsco	1132	X	X	X	X	X	X	X	
08/14/2007	Patapsco	1204			X	X	X	X	X	
08/01/2007	Patapsco	1237			X	X	X		X	
10/30/2007	Patapsco	1335		X	X	X	X	X		
10/01/2007	Patapsco	1339	X		X	X	X	X	X	

Date	Watershed	Pond #	Repaired Fence	Secured Gate	Cleaned Riser	Cleaned Low Flow	Removed Debris	Trimmed Fence	Cleared Berm	Tar Riser
04/27/2007	Patapsco	1555	**X**	**X**	**X**	**X**	**X**	**X**	**X**	
11/29/2007	Patapsco	1560		**X**	**X**	**X**	**X**	**X**	**X**	
09/19/2007	Patapsco	1564	**X**		**X**	**X**	**X**	**X**	**X**	
06/29/2007	Patapsco	1700	**X**	**X**	**X**	**X**	**X**	**X**	**X**	
09/14/2007	Patapsco	1817			**X**	**X**	**X**		**X**	
04/30/2007	Patapsco	2228	**X**	**X**	**X**	**X**	**X**	**X**	**X**	
04/05/2007	Patapsco	3575	**X**							
06/12/2007	Patapsco	3575	**X**							
09/07/2007	Patapsco	4390				**X**	**X**	**X**	**X**	